Vol. 96 (2002) 987–994

RespiratoryMEDICINE

Applying evidence and theory to guide clinical decision making—implications for asthma management

P.W. JONES

St George's Hospital Medical School, London, UK

Abstract Evidence-based medicine has been described as the "conscientious, explicit and judicious use of current best evidence in making decisions about the healthcare of individual patients." Many sources of information may be used by doctors when making decisions about initiating asthma therapy. These include: personal experience, postgraduate education, continuous professional development and publications in peer-reviewed journals. However, despite these sources of information, available data suggest that it is often difficult to practice evidence-based medicine, particularly in general practice. In the future, physicians will be provided with better evidence of the relative efficacy of treatment to aid changes in clinical practice. This will be provided, in part, by large well-conducted clinical trials, systematic reviews and meta-analyses. Linked with these, will be other methods of presenting data, for example, the number of patients needed to treat (NNT) to prevent one clinically significant event (for example, an asthma exacerbation). Despite these advances, incorporation of evidence-based practice into routine asthma care will be a slow and complex process. However, this process can be facilitated by physician education and participation in intervention programmes. In addition, it is important that clinicians are trained in how to convey the best possible evidence to their asthma patients.

doi:10.1053/rmed.2002.1349, available online at http://www.idealibrary.com on IDEAL®

Keywords evidence-based medicine; decision making; asthma.

INTRODUCTION

Evidence-based medicine has been defined by Sackett and colleagues as the "conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients" (1). To achieve this standard of practice, clinicians should act upon evidence as it becomes available, weigh the evidence in a consistent and valid manner and then change their practice appropriately. This simple description hides a very complex system with many steps between the collection of evidence and the prescription of a specific therapeutic intervention by an individual clinician for a specific patient. A few of these steps will be highlighted in this paper that aims to address issues around asthma management. Much of the literature in the field has been derived from diseases other than asthma, although the same general principles apply to physician practice across medicine, not just the narrow field of respiratory disease.

Received 30 July 2001, accepted in revised form 19 February 2002.
Correspondence should be addressed to: Paul W. Jones, St. George's Hospital Medical School, Cranmer Terrace, London SW17 0RE, U.K. Fax: +44-(0)-208-725-5955; E-mail: pjones@sghms.ac.uk

REASONS FOR NOT PRACTICING EFFECTIVELY

Behind the definition of evidence-based medicine quoted above, the reader senses the authors' belief that good and effective practice is the prime objective of most clinicians. This objective may not be held universally, as evidenced by a recent study in British general practice (2). This qualitative study identified a number of reasons why it may be difficult to apply evidenced-based medicine in general practice. The general practitioner's (GP) definitions of effective care fell into three categories: clinical, patient related and resource related. In contrast, the perspective of Sackett *et al*. appears more clinician-centred (1). The British GPs' main reasons for not practicing effectively were patient factors such as their preferences and circumstances. Other factors included lack of time, lack of knowledge and skills, lack of resources and "human failings". The authors of this gloomy report concluded

that the central assumptions of the evidenced-based model of care might not be shared by many GPs.

REASONS FOR HAVING CHANGED PRACTICE

In the study just discussed, the main sources of information in cases of clinical uncertainty were general practice partners and hospital doctors (2). Another qualitative study in general practice (3) identified three models of change in clinical practice:

- An accumulating evidence model in which volume and authority of evidence are important. Sources of evidence include the British Medical Journal, The Drugs and Therapeutics Bulletin (a British government funded evidenced-based treatment newsletter sent regularly to all doctors), trusted consultants and new GP partners (because they had been exposed most recently to new ideas and personal experience).
- A continuity model, which comprised a willingness to change coupled with cost pressures and an understanding of the therapeutic action of the drug.
- A challenge model, this was typified as a change following a dramatic event.

Another study used a critical incident technique to establish reasons why GPs and hospital consultants changed their clinical practice (4). This study illustrated the multiplicity and complexity of events surrounding a change. On average, there were three reasons for each change. The three most frequently mentioned were organizational factors, education and contact with professionals. These accounted for half of the reasons for change. Education, the broad area into which the Sackett definition of evidenced-based medicine falls, accounted for one-sixth of the reasons to change and contributed to less than 40% of the changes. Re-examination of the data presented by Allery *et al*. (4)) shows that there were statistically significant differences in sources of evidence given by GPs and hospital doctors as their reason for changing practice (Table I).

In the studies just quoted, doctors were questioned as to their reasons for changing their practice. It is reasonable therefore to look for evidence that publishing clinical trial data can alter clinical practice. Perhaps one of the best pieces of evidence comes from an opportunistic evaluation (5) of the impact of three studies in coronary artery disease, all published in 1988. (6–8). One trial reported that aspirin reduced the risk of a first myocardial infarction (MI), the second supported the use of aspirin after an MI and the third reported an adverse effect with diltiazem (a calcium channel blocker) when used post-MI . Between 1987 and 1990, the use of aspirin both before and after an MI rose significantly, and the use of calcium antagonists post-MI decreased significantly (5). Thus, publication in a major journal (a favoured source of evidence for hospital consultants) had quite a rapid and significant effect on practice. For example, the use of aspirin post-MI increased from 39 to 72% of patients and the use of calcium antagonists decreased from 57 to 33%.

Table I. Sources given as reasons for changing practice (% of total by clinical group). The difference in distribution of reasons was significant (Chi-square $P < 0.0001$). Data derived from Ref. (4)

	General practitioner	Consultant
Scientific/medical journal	16	36
Medical newspaper	21	0
Scientific meeting/conference	1	20
Postgraduate course	30	8
Protocols and guidelines	8	2
Audit	5	6
Others and unspecified	19	28

PRESENTING THE EVIDENCE FOR TREATMENT EFFICACY

Evidence has to be presented in some way, and because it is usually numerical, graphical presentation is often used. A recent study found that the choice of display format influenced decisions to stop clinical trials (9). A simple icon display was universally not preferred by the respondents as the graphic of choice, but it resulted in correct responses being made from the data in 82% of cases. In contrast, a table format was preferred by 62% of respondents, but its use was associated fewer correct responses (68%). It is noteworthy that in this study concerning decisions to stop clinical trials, more correct decisions were made when the data were negatively framed in tables than positively framed.

One of the favoured methods of presenting data for evidenced-based medicine is the meta-analysis chart, as exemplified in Fig. 1 (10). This particular chart is taken from the Cochrane Library and shows the results of a meta-analysis of the overall effects of comprehensive asthma self-management programmes (including written self-management plans), on hospital admissions. It can be seen that, whilst two of the studies did not achieve statistical significance (i.e. the lower 95% confidence intervals included the zero difference line), the overall effect was significant. This is quite powerful evidence, that should influence asthma management, but how does a busy clinician interpret such data ? How big is the effect and what is a Peto odds ratio?

In recent years, there has been considerable interest in the way evidenced-based decisions are made

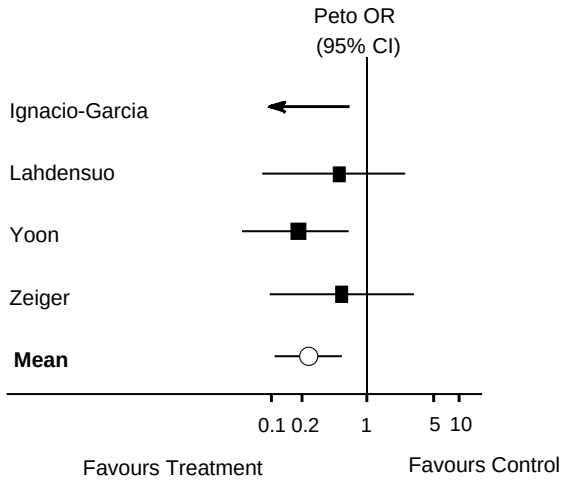

Fig 1. Meta-analysis of four randomized controlled trials of asthma management care programmes that included written self-management plans. The trial names are on the left. The outcome is the odds ratio for the risk of hospital admission. The horizontal lines indicate the 95% confidence limits around the mean odds ratio. The arrow for the uppermost study indicates that the mean value lies further to the left than can be shown in this plot. This graph is derived from Ref. (10).

concerning treatment decisions and purchasing of healthcare. For example, data from the Helsinki Heart Study were presented as absolute event data or as a relative risk reduction to clinicians who were asked to judge the effectiveness of the treatment (11). Ratings of effectiveness were significantly lower when the data were presented as an absolute reduction. A similar observation was made when health authority members were asked to indicate their support for cardiac rehabilitation (12). There was stronger support when the benefits were expressed as a relative risk reduction than as an absolute risk reduction. In this study, the results were also expressed as the number needed to treat (NNT) to prevent an event. When presented in this way, more support was given than when the data were presented as an absolute risk reduction, but less than when they were presented as a relative risk reduction.

EXPRESSING EFFICACY OF ASTHMA TREATMENT AS NNTS

The concept of the NNT has recently been applied to asthma to describe the number of patients who would have to be treated with salmeterol to experience an improvement in health-related quality of life that was at or above the minimum clinically important difference (13). However, there may be a danger in this approach, unless clinicians receive adequate education regarding the NNTs achievable with different treatments for chronic disease. Guyatt *et al*. (13) calculated the NNT for salmeterol to be 4.5, which compared favourably with reports of the NNTs for other interventions. I too interpret this as evidence for worthwhile efficacy of this treatment. Interestingly, a similar analysis of our own data on health status changes after treatment of patients with chronic obstructive pulmonary disease with salmeterol (14), produced an NNT of 5.0. When I discussed this with a colleague, he expressed some dismay. In his view a good NNT was 2, i.e. treat two patients and expect at least one to improve.

KNOWLEDGE *VS* BEHAVIOUR

Education increases knowledge, but may not produce improved behaviour. For example, in a South American study of prescribing for childhood diarrhoea, over 70% of doctors prescribed antibiotics inappropriately despite good knowledge of the appropriate treatment (oral replacement therapy) (15). In another South American study of the same condition, an examination of doctors case records suggested that they prescribed less oral replacement therapy and more antibiotic and anti-diarrhoeal agents than they said they did when interviewed (16). The principle reason for this appeared to be that doctors lacked the ability or motivation to deal with difficult mothers. The authors of one of these South American studies concluded: "prescribing practices seemed to be more related to agreement with social expectations and the caretakers' perception of the physicians' role than they were to standard biomedical rules" (15). Despite the difference in socio-economic conditions, this conclusion was very similar to the views about evidence-based medicine expressed by British GPs discussed earlier (2).

GETTING EVIDENCE INTO PRACTICE

There have been very many studies of methods to change patterns of clinical behaviour. A recent overview summarized the findings from 44 different systematic reviews of this topic (17). Ineffective interventions include published guidelines, local guidelines (unless accompanied by educational interventions) and mail shots. More effective interventions appear to be: feedback (patient report being the most important), continuing medical education, educational outreach (e.g. prescribing advisor), patient-mediated interventions, and computer-based decision support.

One specific effective intervention, educational outreach in the form of a prescribing advisor, is worth specific mention. Results from a randomized controlled trial have shown that therapeutic decision making was improved when a pharmacist outreach programme was implemented (18). This process, also known as academic detailing is largely an American development (19), but is

now being formally tested in the U.K. and other countries. In the U.K., many primary care groups employ pharmacy advisors in part to carry out this type of work. A recent report described the results of a partnership between GPs, nurses and community pharmacists (20). This group identified three goals, one of which was a switch from branded beclomethasone to generic beclomethasone on cost grounds. The GPs were visited four times a year by a specially trained pharmacist. During this time, there was a significant increase in the prescribing of generic beclomethasone. Whilst this prescribing initiative was cost driven, a similar approach is being used to implement the British Thoracic Society Asthma Guidelines in general practice (21).

It is clear that there are no simple solutions and that some solutions may be situation- or culturally specific. Multi-faceted interventions involving a number of different agents for change are likely to be more successful than simple interventions. This conclusion is supported by the results of qualitative surveys of physician attitudes to evidence-based medicine and the barriers to its implementation (2).

GETTING EVIDENCE-BASED PRACTICE INTO ASTHMA MANAGEMENT

It is clear from the foregoing discussion that getting evidence-based practice into routine asthma management is a slow and complex process. However, there is now good evidence from randomized controlled trials that physician education can improve paediatric asthma management (22). This programme was comprehensive and centred upon providing guidance to physicians to enable them to develop a partnership with their patients. The approach was based upon evidence that the patient should be the primary manager of their chronic disease and that the role of the physician and nurse was to coach the patient and devise the best therapeutic regimen (23). Asthma patient treated by such "educated" physicians were more likely to receive prophylactic therapy, to have been taught how to use a metered dose inhaler and to have fewer emergency visits to the GP. There was no effect on emergency department visits or hospital admissions. Perhaps more importantly, among the children who received inhaled corticosteroid therapy, those who were treated by physicians who had participated in the intervention programme also had fewer emergency department visits and hospital admissions.

CONCLUSIONS

A clear message comes from the material reviewed in this paper. There is an abundance of good quality evidence coming from clinical trials, systematic reviews and emerging evidence-based guidelines to guide decision making in asthma management. To be implemented effectively, this evidence has to be presented in a comprehensible way. Programmes to ensure its incorporation into a clinician's practice will have to be comprehensive and sensitive to all the other pressures clinicians experience during their daily work. Finally, the role of the patient in managing their asthma is crucial. Clinicians need training in conveying the best possible evidence to their patients, only then will it be truly implemented.

REFERENCES

1. Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ* 1996; **312**: 71–2.
2. Tomlin Z, Humphreys C, Rogers S. General practitioners' perceptions of effective health care. *BMJ* 1999; **318**: 1532–1535.
3. Armstrong D, Reyburn H, Jones R. A study of general practitioners' reasons for changing their prescribing behaviour. *BMJ* 1996; **312**: 949–952.
4. Allery LA, Owen PA, Robling MR. Why general practitioners and consultants change their clinical practice: a critical incident study. *BMJ* 1997; **314**: 870–874.
5. Lamas GA, Pfeffer MA, Hamm P, Wertheimer J, Rouleau J-L, Braunwald E. Do the results of randomized clinical trials of cardiovascular drugs influence medical practice? *N Eng J Med* 1992; **327**: 241–247.
6. ISIS-2 (Second International Study of Infarct Survival) Collaborative Group. Randomised trial of intravenous streptokinase, oral aspirin, both or neither among 17187 cases of suspected acute myocardial infarction: ISIS-2. *Lancet* 1988; **2**: 349–360.
7. The Isreali Sprint Study Group. Secondary prevention reinfarction Israeli nifedipine trial (SPRINT): a randomised intervention trial of nifedipine in patients with acute myocardial infarction. *Eur Heart J* 1988; **9**: 354–364.
8. The Steering Committee of the Physicians' Health Study Research Group. Preliminary report: findings from the aspirin component of the ongoing Physicians' Health Study. *N Engl J Med* 1988; **318**: 262–264.
9. Elting LS, Martin CG, Cantor SB, Rubenstein EB. Influence of data display formats on physician investigator's decisions to stop clinical trials: a prospective trial with repeated measures. *BMJ* 1999; **318**: 1527–1531.
10. Gibson PG, Coughlan J, Wilson AJ, Abramson M, Baumann A, Hensley MJ, *et al*. Self-management education and regular practitioner review for adults with asthma (Cochrane Review). In: *The Cochrane Library Issue 3*. Oxford: Update Software, 2000.
11. Naylor CD, Chen E, Strauss B. Measured enthusiasm: does the method of reporting trial results alter perceptions of therapeutic effectiveness ? *Ann Int Med* 1992; **117**: 916–921.
12. Fahey T, Griffiths S, Peters TJ. Evidence based purchasing: understanding results of clinical trials and systematic reviews. *BMJ* 1995; **311**: 1056–1060.
13. Guyatt GH, Jiniper EF, Walter SD, Griffith LE, Goldstein RS. Interpreting treatment effects in randomised trials. *BMJ* 1998; **316**: 690–693.
14. Jones PW, Bosh TK. Changes in quality of life in COPD patients treated with salmeterol. *Am J Resp Crit Care Med* 1997; **155**: 1283–1289.
15. Parades P, De La Pena M, Flores-Guerra E, Diaz J, Trsostle J. Factors influencing physicians' prescribing behaviour in the treatment of childhood diarrhoea: knowledge may not be the clue. *Soc Sci Med* 1996; **42**:1141–1153.

16. Beria JU, Damiani MF, Dos Santos IS, Lombardi C. Physicians' prescribing behaviour for diarrhoea in children: an ethnoepidemiological study in southern Brazil. *Soc Sci Med* 1998; **47**: 341–346.
17. NHS Centre for Reviews and Dissemination University of York. Getting evidence into practice. *Effective Health Care* 1999; **5**.
18. Avorn J, Soumerai SB. Improving drug therapy decisions through educational outreach. *N Engl J Med* 1983; **308**:1457–1463.
19. Soumerai SB, Avon J. Principles of educational outreach ('academic detailing') to improve clinical decision making. *JAMA* 1990; **263**: 549–556.
20. Leach RH, Wakeman A. An evaluation of the effectiveness of community pharmacists working with GPs to increase the cost-effectiveness of prescribing. *Pharm J* 1999; **263**: 206–209.
21. Rose S. *Pharm J* 1999: **301**.
22. Clark NM, Gong M, Schork MA, Evans D, Roloff D, Hurwitz M, *et al*. Impact of education for physicians on patient outcomes. *Pediatrics* 1998; **101**: 831–836.
23. Clark NM, Gong M. Management of chronic disease by practitioners and patients: are we teaching the wrong things? *Br Med J* 2000; **320:** 572–575.